

# Mark Scheme (Results) January 2012

## GCE Chemistry (6CH08) Paper 01 Chemistry Laboratory Skills II (WA)

### **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our qualifications website at [www.edexcel.com](http://www.edexcel.com).

For information about our BTEC qualifications, please call 0844 576 0026, or visit our website at [www.btec.co.uk](http://www.btec.co.uk).

If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:  
<http://www.edexcel.com/Aboutus/contact-us/>

Alternatively, you can contact our Science Subject Advisor directly by sending an email to [ScienceSubjectAdvisor@EdexcelExperts.co.uk](mailto:ScienceSubjectAdvisor@EdexcelExperts.co.uk).

You can also telephone 0844 576 0037 to speak to a member of our subject advisor team.

(If you are calling from outside the UK please dial + 44 1204 770 696 and state that you would like to speak to the Science subject specialist).

### **Pearson: helping people progress, everywhere**

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

January 2012

Publications Code UA030275

All the material in this publication is copyright  
© Pearson Education Ltd 2012

## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. Questions labelled with an **asterix (\*)** are ones where the quality of your written communication will be assessed.

## Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

### Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Acceptable Answers	Reject	Mark
<b>1 (a)(i)</b>	<p><b>A</b></p> <pre>       H         H — C — H               C = O         H — C — H               H </pre> <p style="text-align: right;"><b>(1)</b></p> <p><b>B</b></p> <pre>       H         H — C — H         H — C — H               C = O               H </pre> <p style="text-align: right;"><b>(1)</b></p> <p>ALLOW non-displayed alkyl groups, CH<sub>3</sub>, C<sub>2</sub>H<sub>5</sub>.</p> <p>ALLOW skeletal formulae.</p> <p><b>A &amp; B</b> wrong way round – scores <b>(1)</b></p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>1 (a)(ii)</b>	<p><b>Either</b></p> <p><b>B</b> because three (sets of) peaks/ three (proton) environments OR</p> <p><b>B</b> because of 5:3:3 splitting pattern OR</p> <p>Only the aldehyde has a peak greater than 9 ppm <span style="float: right;"><b>(1)</b></span></p> <p><b>Either</b></p> <p><b>A</b> would have only one peak/ one (proton) environment <b>OR</b></p> <p><b>A</b> would have singlet <span style="float: right;"><b>(1)</b></span></p> <p>ALLOW ECF on carbonyls only</p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>1 (b)(i)</b>	Alkene /carbon-carbon double bond /C=C <b>(1)</b>  (primary or secondary) alcohol ALLOW hydroxyl/hydroxyl <b>(1)</b>	Tertiary alcohol/hydroxide/O-H alone	<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>1 (b)(ii)</b>	<b>Any two from:</b> Fizzing/bubbling/effervescence <b>(1)</b>  Sodium dissolves/disappears / decreases in size <b>(1)</b>  White solid/precipitate formed <b>(1)</b>	Gas/hydrogen given off Hisses  Sodium sinks  Reacts vigorously Exothermic/gets hot	<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>1 (b)(iii)</b>	<p>Any two from:</p> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{H} &amp; \text{H} &amp; \text{H} \\   &amp;   &amp;   \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{O}-\text{H} \\   \\ \text{H} \end{array}</math> <b>(1)</b> </div> <div style="text-align: center;"> <math display="block">\begin{array}{c} &amp; \text{H} &amp; \text{H} \\ &amp;   &amp;   \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{H} \\   &amp; &amp;   \\ \text{O} &amp; &amp; \text{H} \\   \\ \text{H} \end{array}</math> <b>(1)</b> </div> <div style="text-align: center;"> <math display="block">\begin{array}{c} &amp; &amp; \text{H} \\ &amp; &amp;   \\ \text{H}-\text{O}-\text{C}=\text{C} &amp; &amp; \text{H} \\   &amp; &amp;   \\ \text{H} &amp; &amp; \text{C}-\text{H} \\ &amp; &amp;   \\ &amp; &amp; \text{H} \end{array}</math> <b>(1)</b> </div> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{H} &amp; \text{OH} &amp; \text{H} \\   &amp;   &amp;   \\ \text{C}=\text{C}-\text{C}-\text{H} \\   &amp; &amp;   \\ \text{H} &amp; &amp; \text{H} \end{array}</math> <b>(1)</b> </div> <p>ALLOW non-displayed CH<sub>3</sub> and/or OH</p> <p>ALLOW skeletal formulae</p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>2 (a)</b>	Iron(II) hydroxide/Fe(OH) <sub>2</sub> / Fe(H <sub>2</sub> O) <sub>4</sub> (OH) <sub>2</sub> / [Fe(H <sub>2</sub> O) <sub>4</sub> (OH) <sub>2</sub> ] /Fe(OH) <sub>2</sub> (H <sub>2</sub> O) <sub>4</sub> / [Fe(OH) <sub>2</sub> (H <sub>2</sub> O) <sub>4</sub> ] /Fe(OH) <sub>2</sub> xH <sub>2</sub> O	[Fe(H <sub>2</sub> O) <sub>4</sub> (OH) <sub>2</sub> ] <sup>2+</sup> [Fe(H <sub>2</sub> O) <sub>6</sub> (OH) <sub>2</sub> ]	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>2 (b)</b>	Ammonia (gas)/NH <sub>3</sub> / NH <sub>3(g)</sub>	Ammonium (gas) NH <sub>4</sub> <sup>(+)</sup>	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>2 (c)</b>	Barium sulfate/Barium sulphate / BaSO <sub>4</sub>		<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>2 (d)</b>	$\text{Fe}^{2+}$ <b>(1)</b> $\text{NH}_4^+$ <b>(1)</b> $\text{SO}_4^{2-}$ <b>(1)</b>  ALLOW: $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot (\text{xH}_2\text{O})$ <b>(2)</b> $\text{Fe}(\text{NH}_4)_2 (\text{SO}_4)_2$ <b>(2)</b>  ALLOW a formula containing all three ions without charges and unbalanced <b>(1)</b>	$\text{NH}_3$ / $\text{NH}_3^+$ / $\text{NH}_4$ If the formula of D is given rather than the ions, the presence of $\text{NH}_3$ scores (0).	<b>3</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (a)(i)</b>	$\frac{50 \times 0.02}{1000} = 0.001 \text{ mol I}_2$  $\frac{25 \times 2}{1000} = 0.05 \text{ mol (CH}_3)_2\text{CO}$  Both quantities correct and propanone in excess <b>(2)</b>  Both quantities correct but incorrect or missing excess <b>(1)</b>  One quantity correct <b>(1)</b>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (a)(ii)</b>	(Graduated) Pipette ( + filler) Accept recognisable spelling e.g pipet	Burette Measuring cylinder	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (a)(iii)</b>	Measuring cylinder Ignore volumes e.g. $25\text{cm}^3$ measuring cylinder	Burette/pipette	<b>1</b>



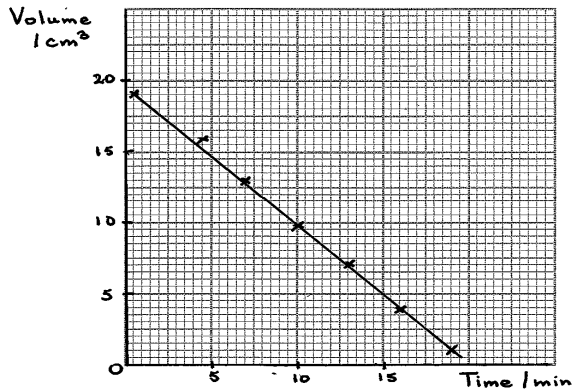
Question Number	Acceptable Answers	Reject	Mark
<b>3 (a)(iv)</b>	To quench /slow /stop the reaction <b>(1)</b>  By reacting with the sulfuric acid / neutralize (the acid) / remove the H <sup>+</sup> ions <b>(1)</b>  Mark independently		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (b)(i)</b>	<b>From</b> yellow/orange/red-brown /brown <b>(1)</b> <b>To</b> colourless / pale yellow <b>(1)</b>  Second mark is dependent on the first	... to clear /yellow	<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (b)(ii)</b>	Starch <b>(1)</b> <b>From</b> blue / blue-black / black <b>To</b> colourless <b>(1)</b>  Mark independently	From Purple.... ...to clear	<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (b)(iii)</b>	As the colour of the iodine solution begins to fade/turns pale yellow/straw coloured/just before the end point <b>(1)</b>	When colourless / yellow/brown	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (c)(i)</b>	Iodine concentration is <b>proportional</b> to the volume of sodium thiosulfate solution		<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (c)(ii)</b>	<p>Axes correctly labelled including units with sensible scales (more than half graph paper used in each direction) <b>(1)</b></p> <p>Points correctly plotted and best fitting straight line drawn <b>(1)</b></p>  <p>Allow - completely correct but axes wrong way round <b>(1)</b></p>	<p>Absence of units</p> <p>Dots joined with straight lines</p>	<b>2</b>

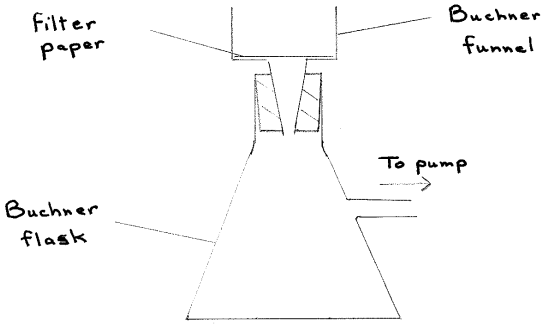
Question Number	Acceptable Answers	Reject	Mark
<b>3 (c)(iii)</b>	<p>reaction is order zero <b>(1)</b></p> <p>rate is constant/gradient is constant/[iodine] does not affect rate <b>(1)</b></p> <p>Mark independently</p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>3 (d)</b>	<p>Iodine is not involved in the rate determining step, (because order is zero with respect to iodine)</p> <p>If 3ciii is not zero order, the mark is only awarded if the candidate states that the order is inconsistent.</p>		<b>1</b>

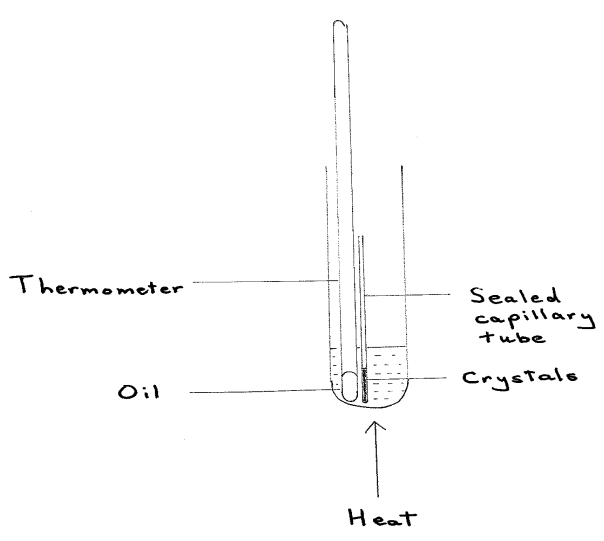
Question Number	Acceptable Answers	Reject	Mark
<b>4 (a)</b>	<p>As liquid(s) vaporise/boil they are cooled and condense back to liquid(s) <b>(1)</b></p> <p>Any <b>two</b> from:  Used to heat volatile liquids <b>(1)</b></p> <p>Prevents escape of flammable vapours <b>(1)</b></p> <p>Prevents escape of reactants/products/solvents <b>(1)</b></p> <p>Allows time to react/Allows complete reaction/Allows faster reaction/increases yield <b>(1)</b></p>	Overcomes activation energy	<b>3</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (b)(i)</b>	<p>To react with/remove (excess) <b>ethanoyl chloride</b></p> <p>IGNORE references to product(s) dissolving</p>	Dissolve unreacted reagents/excess acid/HCl	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (b)(ii)</b>	<p>Reaction (with water) is exothermic /gives out heat/violent/vigorous</p> <p>Note that the answer may be given in b(i)</p>	<p>Reaction explosive</p> <p>Prevent flask cracking</p>	<b>1</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (c)(i)</b>	<p>Buchner/side armed flask <b>(1)</b></p> <p>Side arm connected to pump <b>(1)</b></p> <p>Buchner funnel with flat filter paper The filter paper must be labelled or clearly shown above the pores of the funnel <b>(1)</b></p> 	<p>Large gap between funnel and flask</p> <p>Blocked outlet to pump</p>	<b>3</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (c)(ii)</b>	<p>Faster <b>(1)</b></p> <p>Dries solid/precipitate/crystals OR removes maximum amount of solution <b>(1)</b></p>	<p>Reduces transfer losses</p> <p>Less product lost /higher yield</p>	<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (d)(i)</b>	<p>A variety of methods may be used.</p> <p><b>Either</b></p> <p>Crystals in (sealed) capillary tube (1)</p> <p>Thermometer and capillary in (heated) oil/water bath or in 'melting temperature apparatus' heater (1)</p> <p><b>Or</b></p> <p>Crystals balanced on thermometer (1)</p> <p>Clamped horizontally in horizontal double glass skinned test tube (1)</p>  <p>Thermometer</p> <p>Sealed capillary tube</p> <p>Oil</p> <p>Crystals</p> <p>Heat</p> <p>Note – crystals in a test or boiling tube with a thermometer <b>in the tube</b> (1)</p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (d)(ii)</b>	<p>Melting temperature should be 'sharp'/over a 1-2 °C range/narrow temperature range (1)</p> <p>And at correct value/consistent with literature (1)</p>		<b>2</b>

Question Number	Acceptable Answers	Reject	Mark
<b>4 (e)</b>	<p>Number of moles of reactant  <math>= \frac{3.5}{137} (1) = 0.02555</math></p> <p><b>Either</b>          Number of moles of product  <math>= \frac{2.35}{179} (1) = 0.01313</math></p> <p>Percentage yield  <math>= \frac{0.01313}{0.02555} \times 100</math>  <math>= 51.4/51 \% (1)</math>          ACCEPT 51.5%</p> <p><b>Or</b>          Mass of product = <math>0.02555 \times 179</math> <b>(1)</b>  <math>= 4.573 \text{ g}</math></p> <p>Percentage yield = <math>\frac{2.35 \times 100}{4.573}</math>  <math>= 51.4\%/51\% \text{ (1)}</math>          ACCEPT 51.5%</p> <p>ACCEPT answers to 4 or more sf          provided they round to 51.4 or 51.5</p> <p>Correct answer with no working          scores (3)</p> <p>ALLOW internal TE</p>	Answers to 1 sf	<b>3</b>

**TOTAL FOR PAPER = 50 MARKS**

Further copies of this publication are available from  
International Regional Offices at [www.edexcel.com/international](http://www.edexcel.com/international)

For more information on Edexcel qualifications, please visit  
[www.edexcel.com](http://www.edexcel.com)

Alternatively, you can contact Customer Services at  
[www.edexcel.com/ask](http://www.edexcel.com/ask) or on + 44 1204 770 696

Pearson Education Limited. Registered company number 872828  
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

